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HMC245QS16

GaAs MMIC SP3T NON-REFLECTIVE SWITCH, DC - 3.5 GHz

Typical Applications

The HMC245QS16 is ideal for:

- Basestation Infrastructure
- CATV / DBS
- Wireless Local Loop
- Test Equipment

Features

Low Insertion Loss: 0.5 dB @ 2.0 GHz

Non-Reflective Design

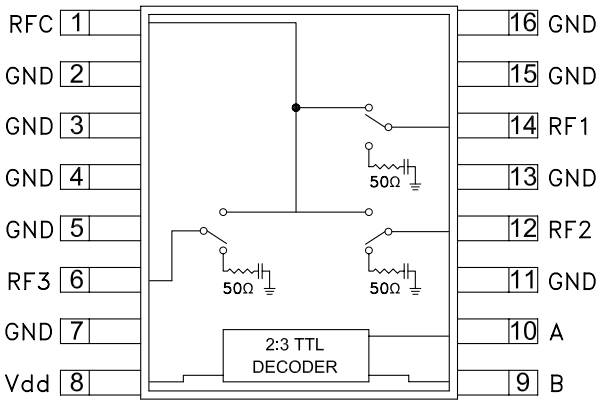
Integrated 2:3 TTL Decoder

"All Off" Isolation State

Single Positive Suppy: Vdd = +5V

16 Lead QSOP SMT Package

Functional Diagram



General Description

The HMC245QS16 is a low cost non-reflective SP3T switch in a 16-lead QSOP surface mount package. Covering DC to 3.5 GHz, the switch offers 30 to 40 dB isolation and a low insertion loss of 0.5 dB. A 2:3 TTL/CMOS compatible decoder is integrated on the switch requiring only 2 control lines and a single +5V bias to select each path, replacing 6 control lines normally required by GaAs SP3T switches.

Electrical Specifications, T_A = +25° C, For TTL Control and Vdd= +5V in a 50 Ohm System

Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 2.0 GHz DC - 3.0 GHz DC - 3.5 GHz		0.5 0.6 0.7	0.8 0.9 1.0	dB dB dB
Isolation		DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.5 GHz	40 35 31 26	44 39 35 30		dB dB dB dB
Return Loss	"On State"	DC - 1.5 GHz DC - 3.5 GHz		20 17		dB dB
Return Loss RF1 - 3	"Off State"	0.3 - 3.5 GHz 0.5 - 3.5 GHz		12 15		dB dB
Input Power for 1 dB Compression		0.3 - 2.5 GHz 0.3 - 3.5 GHz	23 22	26 25		dBm
Input Third Order Intercept (Two-tone Input Power = +7 dBm each tone)		0.3 - 2.5 GHz 0.3 - 3.5 GHz	44 40	48 44		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)		0.3 - 3.5 GHz		40 150		ns ns

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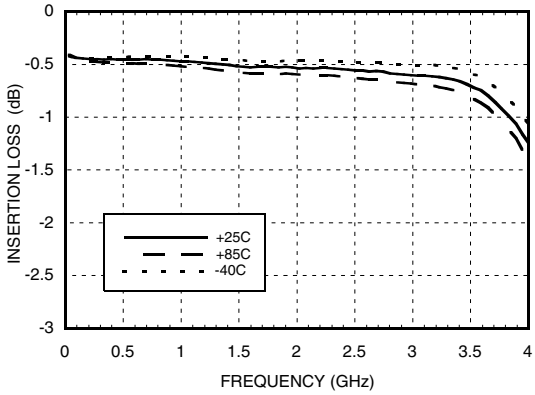
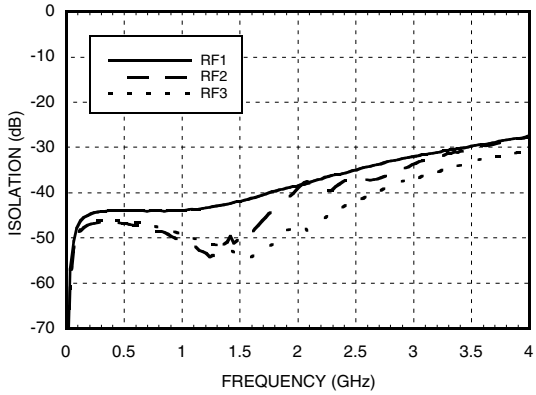
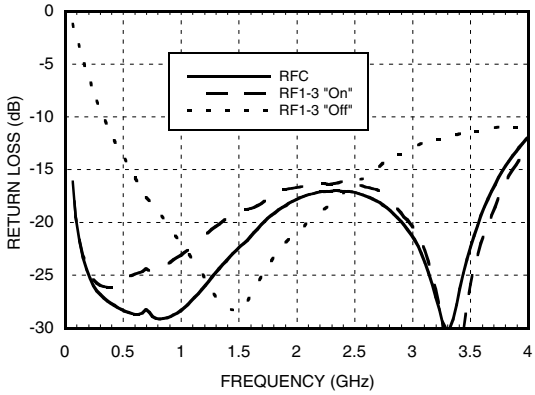
Insertion Loss vs. Temperature



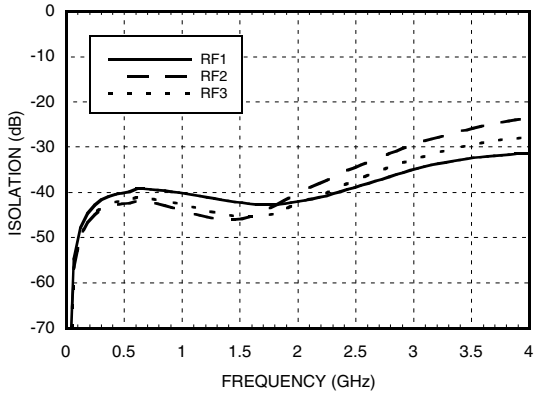
Isolation



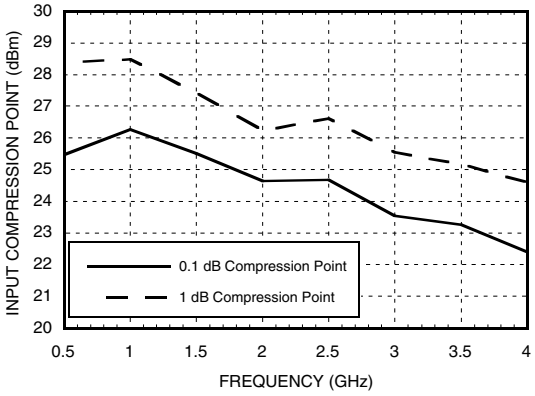
Return Loss



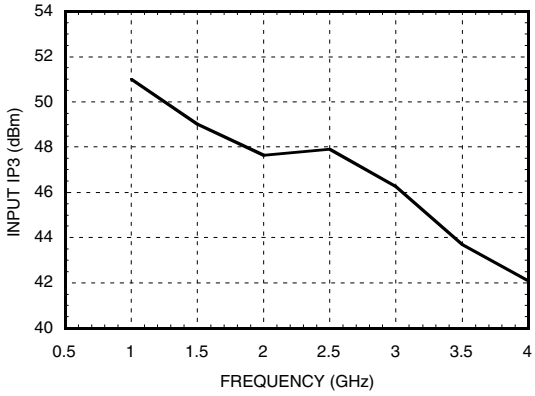
Off State Isolation



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Absolute Maximum Ratings

Bias Voltage Range (Port Vdd)	+7.0 Vdc
Control Voltage Range (A & B)	-0.5V to Vdd +1 Vdc
Channel Temperature	150 °C
Thermal Resistance (Insertion Loss Path)	210 °C/W
Thermal Resistance (Terminated Path)	250 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
Maximum Input Power Vdd = +5 Vdc	+20 dBm (0.05 - 0.5 GHz) +27 dBm (0.5 - 3.5 GHz)

Bias Voltage & Current

Vdd Range= +5.0 Vdc ±10%		
Vdd (Vdc)	Idd (Typ) (mA)	Idd (Max) (mA)
+5.0	3.0	6.0

Truth Table

Control Input		Signal Path State
A	B	RF COM to:
Low	Low	RF1
High	Low	RF2
Low	High	RF3
High	High	All Off

TTL/CMOS Control Voltages

State	Bias Condition
Low	0 to +0.8 Vdc @ 5 uA Typ.
High	+2.0 to +5.0 Vdc @ 70 uA Typ.

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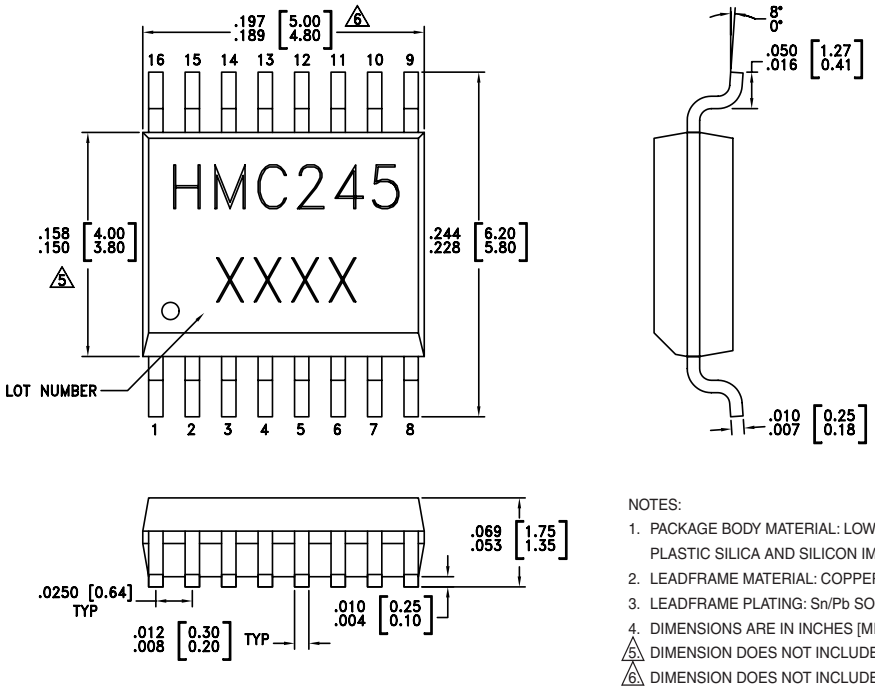
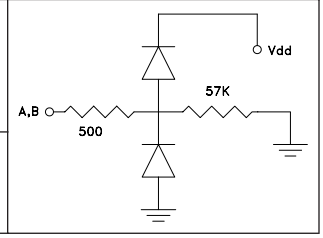
Outline Drawing



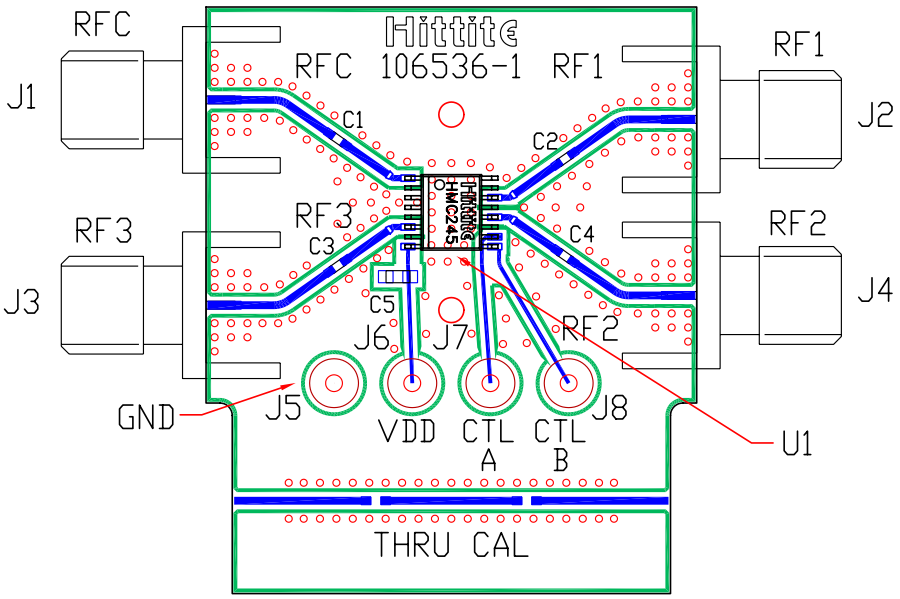
NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 6, 12, 14	RF3, RF2, RF1, RFC	This pin is DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
2 - 5, 7, 11, 13, 15, 16	GND	This pin must be connected to PCB RF ground to maximize isolation.	
8	Vdd	Supply Voltage +5.0 Vdc ±10%	
9	B	See truth table and control voltage table.	
10	A	See truth table and control voltage table.	

Evaluation PCB



List of Material

Item	Description
J1 - J4	PC Mount SMA RF Connector
J5 - J8	DC Pin
C1 - C4	100 pF Capacitor, 0402 Pkg.
C5	10k pF Capacitor, 0603 Pkg.
U1	HMC245QS16 SP3T Switch
PCB*	106536 Evaluation PCB
* Circuit Board Material: Rogers 4350	

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.

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Notes: